

Claims

What is claimed is:

1. A method for transforming multiple alternative equality conditions between a database column and a set of values comprising the steps of:
  - 5 identifying one or more groups of consecutive values in the set;  
removing equality conditions corresponding to the values in one or more of the identified groups; and  
adding one or more inequality conditions corresponding to the one or more of the identified groups.
- 10 2. The method of claim 1 further comprising the step of:  
checking whether the database column is a non-indexed column.
3. The method of claim 1 further comprising the step of:  
checking whether the set of values includes only literal discrete values.
4. The method of claim 1 further comprising the step of:  
15 checking whether the set contains more values than a specified lower limit.
5. The method of claim 1 where identifying one or more groups of consecutive values in the set comprises identifying the non-overlapping groups with the largest numbers of consecutive values.
6. The method of claim 1 further comprising the steps of:  
20 removing the values in the one or more of the identified groups from the set; and  
adding ranges of values corresponding to the values in the one or more of the identified groups to the set.
7. The method of claim 1 where removing equality conditions corresponding to the values in the one or more of the identified groups comprises creating a group of equality conditions that  
25 does not include equality conditions corresponding to those values.

8. The method of claim 1 where adding one or more inequality conditions corresponding to the one or more of the identified groups comprises, for each group:

adding a greater than or equal to condition between the database column and the least member of the group; and

5 adding a less than or equal to condition between the database column and the greatest member of the group.

9. The method of claim 1 where identifying one or more groups of consecutive values in the set comprises identifying one or more groups of at least three consecutive values in the set.

10. A computer program, stored on a tangible storage medium, for executing database queries that include multiple alternative equality conditions between a database column and a set of values, the program comprising executable instructions that cause a computer to:

identify one or more groups of consecutive values in the set;

remove equality conditions corresponding to the values in one or more of the identified groups; and

15 add one or more inequality conditions corresponding to the one or more of the identified groups.

11. The computer program of claim 10 further comprising executable instructions that cause the computer to:

check whether the database column is a non-indexed column.

20 12. The computer program of claim 10 further comprising executable instructions that cause the computer to:

check whether the set of values includes only literal discrete values.

13. The computer program of claim 10 further comprising executable instructions that cause the computer to:

25 check whether the set contains more values than a specified lower limit.

14. The computer program of claim 10 where the computer identifies one or more groups of consecutive values in the set by identifying the non-overlapping groups with the largest numbers of consecutive values.

15. The computer program of claim 10 further comprising executable instructions that cause the computer to:

remove the values in the one or more of the identified groups from the set; and

5 add ranges of values corresponding to the values in the one or more of the identified groups to the set.

16. The computer program of claim 10 where the computer removes equality conditions corresponding to the values in the one or more of the identified groups by creating a group of equality conditions that does not include equality conditions corresponding to those values.

10 17. The computer program of claim 10 where the computer adds one or more inequality conditions corresponding to the one or more of the identified groups by, for each group:

adding a greater than or equal to condition between the database column and the least member of the group; and

adding a less than or equal to condition between the database column and the greatest member of the group.

15 18. The computer program of claim 10 where the computer identifies one or more groups of consecutive values in the set by identifying one or more groups of at least three consecutive values in the set.

19. A database system for executing database queries, comprising:

one or more nodes;

20 a plurality of CPUs, each of the one or more nodes providing access to one or more CPUs;

a plurality of virtual processes, each of the one or more CPUs providing access to one or more virtual processes;

25 each virtual process configured to manage data, including rows organized in tables, stored in one of a plurality of data-storage facilities; and

an optimizer configured to:

identify one or more groups of consecutive values in the set;

remove equality conditions corresponding to the values in one or more of the identified groups; and

add one or more inequality conditions corresponding to the one or more of the identified groups.

20. The database system of claim 19 where the optimizer is further configured to:  
check whether the database column is a non-indexed column.
- 5 21. The database system of claim 19 where the optimizer is further configured to:  
check whether the set of values includes only literal discrete values.
22. The database system of claim 19 where the optimizer is further configured to:  
check whether the set contains more values than a specified lower limit.
- 10 23. The database system of claim 19 where the optimizer identifies one or more groups of  
consecutive values in the set by identifying the non-overlapping groups with the largest numbers  
of consecutive values.
24. The database system of claim 19 where the optimizer is further configured to:  
remove the values in the one or more of the identified groups from the set; and  
add ranges of values corresponding to the values in the one or more of the identified  
15 groups to the set.
25. The database system of claim 19 where the optimizer removes equality conditions  
corresponding to the values in the one or more of the identified groups by creating a group of  
equality conditions that does not include equality conditions corresponding to those values.
- 20 26. The database system of claim 19 where the optimizer adds one or more inequality  
conditions corresponding to the one or more of the identified groups by, for each group:  
adding a greater than or equal to condition between the database column and the least  
member of the group; and  
adding a less than or equal to condition between the database column and the greatest  
member of the group.

27. The database system of claim 19 where the optimizer identifies one or more groups of consecutive values in the set by identifying one or more groups of at least three consecutive values in the set.